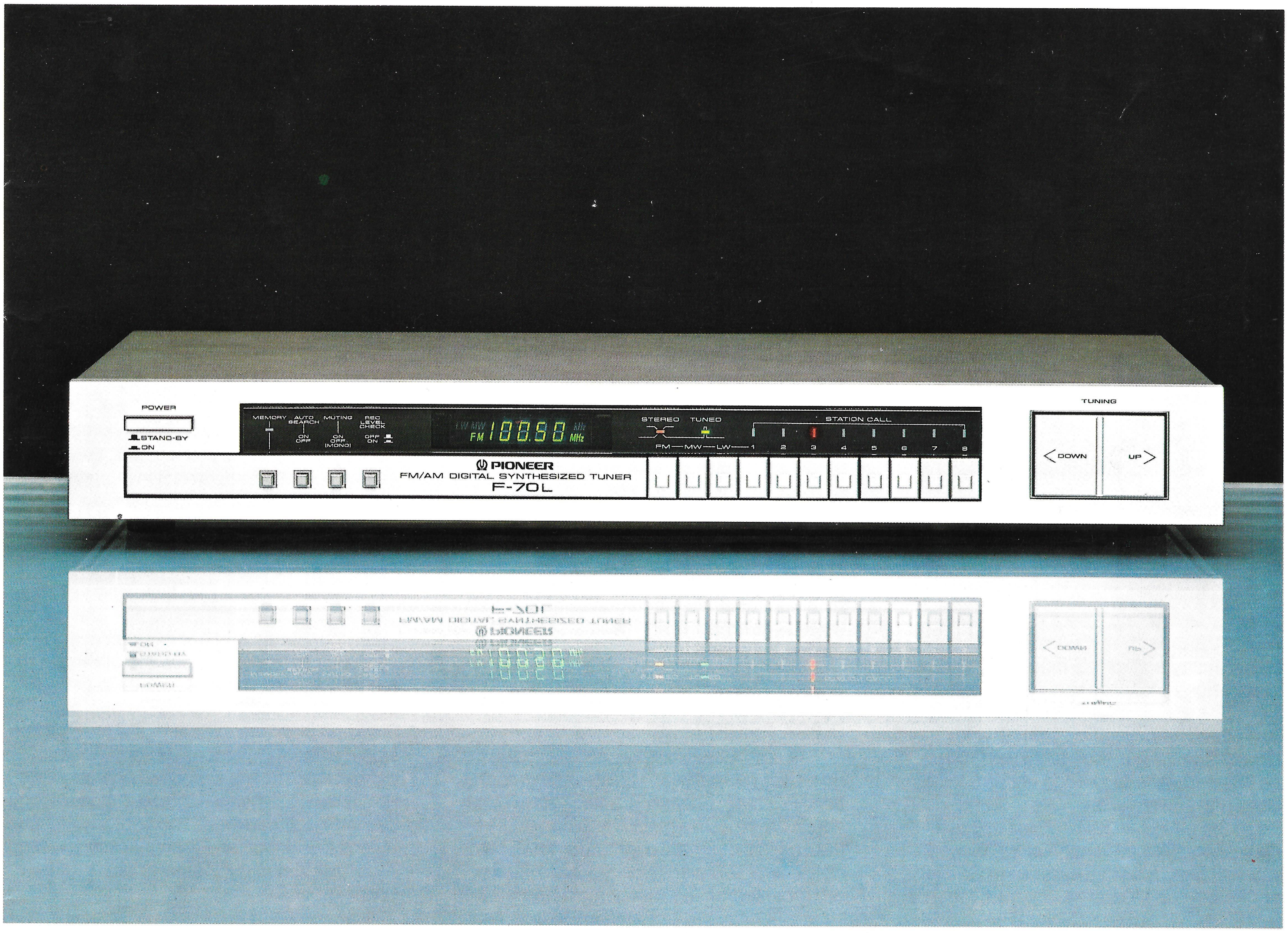
F-70L

QUARTZ-DIGITAL SYNTHESIZER FM/MW/LW TUNER



High-technology circuitry, easy to use controls, slim design

The F-70L is a fine example of what Pioneer stands for — highest possible quality at the best possible price. Inside its slim cabinet is our newest and most powerful technology that gives it not only incomparable performance but also unmatched ease of use.

The linear front end eliminates "ghost stations" on the tuning band by reducing RF intermodulation. By effectively rejecting interference and image frequencies, it makes the tuner a particularly good performer in metropolitan areas where there are innumerable stations for you to choose from.

The front end is controlled by a quartz crystal oscillator, the reason why the tuner performs stably without drift and offers preset station convenience. At your fingertips are eight FM and eight AM (MW/LW) stations of your choice. Each time you recall a preset station, it will be perfectly tuned. What we call a "pulse swallow" system in the front end uses a quartz-derived reference frequency that is twice as high as normal — 25kHz. Since the 25kHz frequency does not fall within the audible range, it cannot accidentally mix with audio signals. One improvement it brings is a high signal-to-noise ratio of 80dB for stereo.

Hi-fi sound is further assured by our "Direct-Through" Multiplex Demodulator. Programme signals do not pass through "switching" transistors, as they do in common demodulators. Distortion caused by transistor switching is avoided, and clean stereo signals are available at the output.

For convenience, you can preset 8 FM and 8 AM (MW/LW) stations. Also available are two tuning modes — Auto Search for automatically searching for stations up and down the tuning band, and Manual Search for checking every frequency in prescribed intervals.

A convenience called Record Level Check helps you find the optimum recording level for your tape deck when recording from radio.

Pioneer Cassette Decks

The Technology

With the arrival of the digital audio age, we decided that it was an opportune time to go back to the basics and "rethink" the cassette deck. Our intensive study into every aspect of cassette deck design culminated in the development of the most highly sophisticated decks we have ever offered: models CT-A9 and CT-A7, each featuring our new "Reference Master Mechanism." For the first time, cassette deck performance has been brought up to the exacting standards of digital audio. We expect models CT-A9 and CT-A7 to become the benchmarks by which all other cassette decks are judged.

Staggered-resonance closed-loop dual-capstan drive

Tape tension variations, tape skew, tape speed variations, etc., are the factors that prevent the tape from smoothly and accurately running across the heads. Of all tape drive designs presently known, the closed-loop dual-capstan drive is considered to be most effective in assuring smooth and precise tape flow. It uses two pinch rollers and two capstans to provide uniform tape speed and tape tension.

In the CT-A9 and CT-A7, we use a highly sophisticated version of the closed-loop dual-capstan drive system — we call it the "Reference Master Mechanism." In our version, the two capstans differ in diameter (and, therefore, in rotation speed) as do the two matched pinch rollers. Peaks in wow and flutter are thus staggered so as not to excite resonance. The result is record-low wow and flutter — only 0.018% (WRMS) or ±0.048% (DIN) in the CT-A9. Since tape tension is uniform, modulation noise and level variations are also reduced.

To assure accurate tape traction and prevent tape slippage, the perimeter surface of the capstan is given what we call an "FS finish." It further reduces wow and flutter, modulation noise, output variations and dropouts to inaudible levels.

In summary, the Pioneer "Reference Master Mechanism" results in sound that is completely devoid of fuzziness and muddiness. Transients are reproduced faithfully, dynamic range is extended, while noise is essentially eliminated. It's sound realism's finest hour.

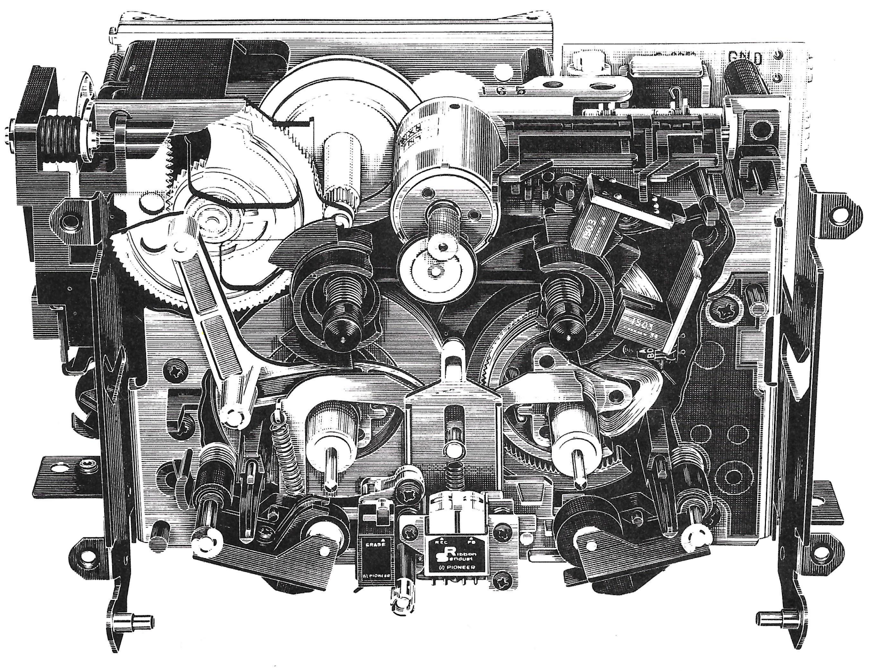
Precision tape transport and head block assemblies

In our "Reference Master Mechanism," no part is permitted to vibrate during operation. The main chassis is a thick steel plate about 2.5 times as resistant to bending as the chassis of lesser decks. The head block consists of two pieces of die-cast zinc that are mounted on the mechanism base. When mounting the head block on the chassis, we use optical instrumentation to avoid even the minutest alignment discrepancy. Our attention to detail ensures that the tape runs smoothly across the heads, with as little skew, phase variation and azimuth misalignment as technically possible.

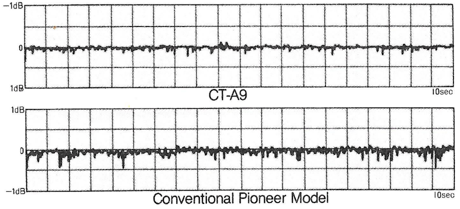
4-bit microcomputer control for smooth, accurate and silent operation

The tape transport mechanism in the CT-A9 and CT-A7 operates under supervision of a 4-bit microcomputer. Working in combination with a device called an "absolute encoder," it accurately controls the DC motor through a digital feedback system. The encoder monitors the positions of all mechanical parts of the deck, and transmits this information to the computer. The computer then times and coordinates everything — power to the reel motor, the cutting in of the muting circuit, etc. — down to the split second for smoothest possible operation. Since no plungers are used, the mechanism works with total silence. Microcomputer control also means simplified operation. For instance, when you place a tape into the cassette compartment, the door closes, the tape is positioned and tape slack is taken up — all automatically thanks to our "Auto Loading."

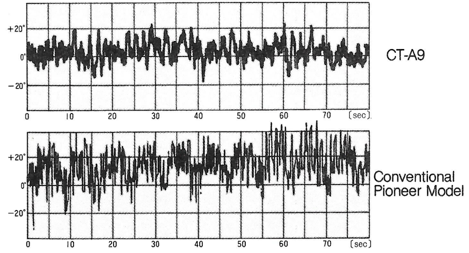
"Reference Master Mechanism"



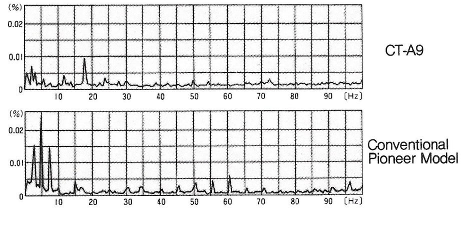
● Level Variation (10kHz)



● Phase Variation (10kHz)



● Frequency Analysis of Wow & Flutter Components



Cassette Tape Decks

	CT-A9	CT-A7	CT-90R
Type	4-track, 2-channel recording and playback stereo cassette tape deck	4-track, 2-channel recording and playback stereo cassette tape deck	4-track, 2-channel auto-reverse recording and playback stereo cassette tape deck
Motors:	Quartz-PLL direct-drive motor for capstan drive × 1, Coreless DC motor for reel drive × 1	DC-servo motor for capstan drive × 1, DC motor for reel drive × 1	Direct-drive, brushless DC-servo Hall-motor for capstan, Two direct-drive brushless DC-servo Hall-motors for each reel
Heads:	"Ribbon Sendust" recording & playback combination head, Special alloy erasing head × 1	"Ribbon Sendust" recording & playback combination head, Special alloy erasing head × 1	"Ribbon Sendust" recording & playback combination head (swivel), Alperm (special alloy) erasing head × 2
Fast Winding Time (C-60 tape):	80 seconds	80 seconds	90 seconds
Wow and Flutter (WRMS):	0.018%	0.028%	0.03%
(DIN):	±0.048%	±0.085%	±0.16%
Frequency Response			
Normal tape (−20dB):	20 — 21,000Hz (30 — 19,000Hz ±3dB)	20 — 20,000Hz (30 — 19,000Hz ±3dB)	20 — 19,000Hz (20 — 18,000Hz ±3dB)
Chrome tape (−20dB):	20 — 22,000Hz (25 — 20,000Hz ±3dB)	20 — 20,000Hz (25 — 19,000Hz ±3dB)	20 — 19,000Hz (20 — 18,000Hz ±3dB)
(0dB):	20 — 11,000Hz	20 — 11,000Hz	20 — 10,000Hz
Metal tape (−20dB):	20 — 23,000Hz (25 — 21,000Hz ±3dB)	20 — 20,500Hz (25 — 20,000Hz ±3dB)	20 — 20,000Hz (20 — 19,000Hz ±3dB)
(0dB):	20 — 16,000Hz	20 — 16,000Hz	20 — 15,000Hz
Signal-to-Noise Ratio (Dolby off):	58dB*	57dB*	58dB*
Harmonic Distortion (0dB):	0.8%	0.8%	0.8%
Inputs (Sensitivity/Impedance)			
MIC (6mmø jack × 2):	—	—	0.25mV/600 ohms
LINE (pin jack × 2):	63mV/100k ohms	63mV/120k ohms	70mV/50k ohms
Outputs (Reference level/Impedance)			
LINE (pin jack × 2):	630mV/7k ohms	630mV/3k ohms	700mV (max.)/10k ohms
HEADPHONES (6mmø stereo jack × 1):	0.45mW/8 ohms	0.45mW/8 ohms	0.8mW (max.)/8 ohms
Power Requirements:	220/240V (switchable) 50-60Hz	220/240V (switchable) 50-60Hz	220/240V (switchable) 50-60Hz
Power Consumption:	54 watts	35 watts	57 watts
Dimensions (W × H × D):	420 × 130 × 374 mm	420 × 130 × 374 mm	420 × 120 × 355 mm
(without package)	16-9/16 × 5-1/8 × 14-3/4 inches	16-9/16 × 5-1/8 × 14-3/4 inches	16-9/16 × 4-3/4 × 14 inches
Weight (without package):	10kg/22 lbs. 1 oz.	7.9kg/17 lbs. 7 oz.	7.2kg/15 lbs. 14 oz.

*S/N is improved by 10dB with Dolby B on and by 19dB with Dolby C on (except CT-1040W and CT-X8W), both at 5kHz.

NOTE:

(1) Reference tape: Normal and LH tapes are DIN 45513 (Fe).
Chrome tape is DIN 45513 (Cr).
(2) Reference recording level is meter 0dB level. (160 nwb/m magnetic level = Philips cassette reference level.)
(4) Reference signal is 315Hz.
(3) Wow and Flutter: at 3kHz, WRMS (JIS), at 3,150Hz weighted PEAK (DIN 45507).
(5) Frequency Responses are measured at −20dB and at 0dB levels respectively for reference recording level, Dolby off.
Level deviation is ±6dB (where not indicated). (DIN 45500)
(6) Signal-to-Noise Ratio: Measured at the third harmonic distortion 3% level, weighted (DIN 45513/BLATT7).
(7) Sensitivity: Input level (mV) for reference recording level measured with input (recording) level control set at maximum position.
(8) Maximum allowable input level (mV) is measured at the point where the output signal wave is clipped while gradually turning the input level control.
(9) Reference output level is LEDs display's 0dB level.
(10) Maximum output (Playback) level: Output level to reference recording level, measured with an output (Playback) level control set at maximum position.

***Specifications quoted for "metal" tapes are approximate.**
See manufacturers' data for individual tapes.

Add-On Components

MA-100

Inputs (Reference level/Impedance)	
Source, Tape:	85mV/50k ohms
Ch-1 — 4 Mic:	0.4mV/50k ohms
Guitar:	4mV/50k ohms
Inst.:	38mV/50k ohms
Output (Reference level/Impedance)	
Line out:	150mV/600 ohms
Gain	
Source, Tape:	5dB
Ch-1 — 4 (Mic/Guitar/Inst.):	51dB/31dB/12dB
Parametric Equaliser Section (Ch-3, 4)	
Low:	±10dB at 100 — 900Hz (variable)
High:	±10dB at 1k — 13kHz (variable)
Echo Time:	3 sec. (max.)
Total Harmonic Distortion:	0.008% (1kHz, output 1.5V)
Signal-to-Noise Ratio (IHF, A-network, output 1V)	
Source, Tape:	83dB
Ch-1 — 4 (Mic/Guitar/Inst.):	75dB
Frequency Response (volume: −3dB)	
Source, Tape:	10 — 80,000Hz 0dB, −3dB
Ch-1 — 4 Mic:	150 — 20,000Hz
Guitar, Inst.:	30 — 20,000Hz
Power Requirement:	220V or 240V 50-60Hz
Power Consumption:	15 watts
Dimensions (W × H × D):	420 × 158 × 227 mm
(without package)	16-9/16 × 6-1/4 × 8-15/16 inches
Weight (without package):	4.2kg/9 lbs. 4 oz.

CA-100

Inputs (Reference level/Impedance)	
Source (fader: −3dB):	150mV/50k ohms
Tape (fader: −3dB):	150mV/50k ohms
Mic 1, 2:	0.3mV/25k ohms
Outputs (Reference level/Impedance)	
Line:	150mV/330 ohms
Rec:	150mV/2.5k ohms
Gain	
Source, Tape/Mic:	3dB/53dB
Graphic Equaliser Section	
Equaliser Range:	±10dB
Centre Frequencies:	60Hz, 150Hz, 400Hz, 1kHz, 2.4kHz, 6kHz, 15kHz
Echo Time (Mic):	2 sec. (max.)
Frequency Response	
Source, Tape:	10 — 80,000Hz 0dB, −3dB
Mic 1, 2:	150 — 10,000Hz 0dB, −3dB
Total Harmonic Distortion	
Source, Tape:	0.01% (1kHz, output 1.5V)
Signal-to-Noise Ratio (IHF, A-network, output 1V)	
Source, Tape:	90dB (Graphic Equaliser ON/ Volume centre)
Mic 1, 2:	69dB (Graphic Equaliser ON/ Volume centre)
Power Requirement:	220V or 240V 50-60Hz
Power Consumption:	25W
Dimensions (W × H × D):	420 × 158 × 226 mm
(without package)	16-9/16 × 6-1/4 × 8-7/8 inches
Weight (without package):	4.2kg/9 lbs. 4 oz.

SG-90

Equaliser Range:	±12dB/±6dB (switchable)
Centre Frequencies:	16, 25, 40, 63, 100, 160, 250, 400, 630, 1k, 1.6k, 2.5k, 4k, 6.3k, 10k, 16k, 25kHz
Total Harmonic Distortion:	0.001% (20 — 20,000Hz all controls flat, output 1V)
Gain:	0dB (controls flat)
Frequency Response:	10 — 100,000Hz 0dB, −2dB
Signal-to-Noise Ratio: (IHF, A-network)	120dB (output 2V), 114dB (output 1V)
Input Impedance:	47k ohms
Output Impedance:	200 ohms
Power Requirements:	220/240V (switchable) 50-60Hz
Power Consumption:	40 watts
Dimensions (W × H × D):	420 × 131 × 351 mm
(without package)	16-9/16 × 5-3/16 × 13-13/16 inches
Weight (without package):	7.2kg/15 lbs. 14 oz.

A-60
100W + 100W (T.H.D. 0.007%, 8 ohms) 130W + 130W (8 ohms)
0.007% (continuous rated power output)
60
2.5mV/50k ohms 0.2mV/100 ohms 150mV/50k ohms
200mV/17mV (T.H.D. 0.005%)
150mV/2.2k ohms A, B, A + B, OFF Low impedance
20 — 20,000Hz ±0.2dB 5 — 100,000Hz 0dB, –3dB
±10dB (100Hz) ±10dB (10kHz)
15Hz (–6dB/oct.)
+6dB (100Hz), +3dB (10kHz)
86dB (MM), 70dB (MC) 105dB
74dB/61dB (MM) 88dB/62dB
220/240V (switchable) 50-60Hz
700 watts (max.)
420 × 130 × 331 mm 16-9/16 × 5-1/8 × 13-1/16 inches
9.4kg/20 lbs. 12 oz.

Tuners

	F-90	F-70L
FM SECTION		
Usable Sensitivity (mono):	10.8dBf (0.95μV, 75 ohms)	10.8dBf (0.95μV, 75 ohms)
50dB Quieting Sensitivity		
Mono:	16.2dBf (1.8μV, 75 ohms)	16.2dBf (1.8μV, 75 ohms)
Stereo:	37.7dBf (21.0μV, 75 ohms)	37.2dBf (19.8μV, 75 ohms)
Sensitivity (DIN)		
Mono (26dB S/N, 75 ohms):	0.75μV	0.75μV
Stereo (46dB S/N, 75 ohms):	22μV	22μV
Signal-to-Noise Ratio		
Mono/Stereo (IHF):	93dB/86dB (at 80dBf)	85dB/80dB (at 85dBf)
Mono/Stereo (DIN):	83dB/77dB	72dB/65dB
Distortion	(at 80dBf)	(at 85dBf)
100Hz (mono/stereo):	0.0095%/0.02%	0.05%/0.08%
1kHz (mono/stereo):	0.0095% (narrow; 0.09%)/ 0.02% (narrow; 0.5%)	0.05%/0.08%
10kHz (mono/stereo):	0.01%/0.07%	0.1%/0.2%
Frequency Response:	20 — 15,000Hz +0.2dB, –0.8dB	30 — 15,000Hz +0.5dB, –1.0dB
Capture Ratio:	0.8dB	1.0dB
Alternate Channel Selectivity:	85dB (400kHz)	56dB (400kHz)
Muting Threshold:	25.2dBf (5μV, 75 ohms)	30dBf (8.5μV, 75 ohms)
Stereo Separation:	65dB (1kHz), 50dB (20 — 10,000Hz) (narrow; 40dB)	50dB (1kHz), 35dB (50 — 10,000Hz)
Aerial Input:	300 ohms balanced 75 ohms unbalanced	300 ohms balanced 75 ohms unbalanced
AM SECTION		
MW (Medium Wave) Section		
Sensitivity		
IHF, Loop Aerial:	150μV/m	150μV/m
Signal-to-Noise Ratio:	50dB	50dB
Aerial:	Loop aerial	Loop aerial
LW (Long Wave) Section		
Sensitivity		
IHF, Loop aerial:	—	150μV/m
Signal-to-Noise Ratio:	—	50dB
AUDIO SECTION		
Output (Level/Impedance)		
FM (100% Mod, Fixed):	650mV/900 ohms	650mV/1.7k ohms
AM (30% Mod, Fixed):	150mV/900 ohms	150mV/1.7k ohms
MISCELLANEOUS		
Power Requirements:	220/240V (switchable) 50-60Hz	220V or 240V 50-60Hz
Power Consumption:	14 watts	8 watts
Dimensions (W × H × D): (without package)	420 × 61 × 317 mm 16-9/16 × 2-3/8 × 12-1/2 inches	420 × 60 × 221 mm 16-9/16 × 2-3/8 × 8-11/16 inches
Weight (without package):	4.5kg/9 lbs. 15 oz.	2.5kg/5 lbs. 8 oz.

Open-Reel Tape Deck

RT-909	
Drive System:	3-motor drive system Solenoid drive, direct switchable function buttons and preset function buttons for timer recording and playback
Motors:	FG-servo DC motor × 1 (dual capstan drive), 6-pole inner-rotor special induction motor × 2 (reel drive)
Tape Heads:	4-track, 2-channel Ferrite erasing head × 1, 4-track, 2-channel Hard Permalloy recording head × 1, 4-track, 2-channel Hard Permalloy playback head × 1, 4-track, 2-channel Hard Permalloy reverse playback head × 1
Maximum Reel Size:	10-1/2-inch reel
Tape Speeds:	19cm/sec. (7-1/2 ips), 9.5cm/sec. (3-3/4 ips) ±0.6%
Fast Rewinding Time:	120 seconds (10-1/2-inch reel, 720m)
Wow and Flutter:	0.04% (WRMS), ±0.1% (DIN) (at 19cm/sec., 7-1/2 ips) 0.08% (WRMS), ±0.16% (DIN) (at 9.5cm/sec., 3-3/4 ips)
Signal-to-Noise Ratio:	60dB (at 19cm/sec., 7-1/2 ips) 55dB (at 9.5cm/sec., 3-3/4 ips)
Harmonic Distortion:	1% (at 19cm/sec., 7-1/2 ips)
Frequency Response:	19cm/sec. (7-1/2 ips): 20 to 30,000Hz (20 to 28,000Hz ±3dB, LH tape), 9.5cm/sec. (3-3/4 ips): 20 to 20,000Hz (20 to 18,000Hz ±3dB, LH tape)
Crosstalk:	50dB
Stereo Channel Separation:	50dB
Erasing Coefficient:	60dB
Bias Frequency:	125kHz
Equaliser:	NAB curve (19cm/sec., 7-1/2 ips, 9.5cm/sec., 3-3/4 ips)
Inputs (Sensitivity/Maximum allowable level/Input impedance)	
MIC (6mmø jack × 2):	0.316mV/80mV/27k ohms (Reference MIC impedance; 250 ohms to 10k ohms)
LINE (pin jack × 2):	50mV/25V/50k ohms
Outputs (Reference level/Maximum level/Load impedance)	
LINE (pin jack × 2):	450mV/900mV/2.6k ohms
HEADPHONES (6mmø stereo jack × 1):	50mV/100mV/8 to 250 ohms
Power Requirements:	120/220/240V (switchable) 50-60Hz
Power Consumption:	106W (UL)
Dimensions (W × H × D): (without package)	480 × 340 × 318 mm 18-7/8 × 13-3/8 × 12-1/2 inches
Weight (without package):	21.5kg/47 lbs. 6 oz.